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ABSTRACT

Highlights from the analysis are: (1) a continuing decrease in the number of physics bachelor's degrees granted; (2) a small increase in the percentage of bachelor's degree recipients who become graduate physics students; (3) a further increase in the proportion of first-year graduate physics students who are assured of teaching assistantships; (4) a small but continuing increase in the proportion of women among the physics degree recipients. Tables include: (1) characteristics of physics bachelor's degree recipients, 1973-1974; (2) postbaccalaureate plans of the members of five minority groups among the 1974 physics bachelor's degree recipients; (3) postbaccalaureate plans of successive graduating classes of physics bachelors; (4) sources of anticipated support for fitst-year graduate study; (5) changes in employment outlook for new physics bachelor's degree recipients 1968-74; (6) use of physics training by newly employed physics bachelors; (7) full-time employment of new physics bachelor's degree recipients, 1974; (8) starting salaries for new physics bachelors; (9) median starting salaries for chemists and chemical engineers at the bachelor's level; (10) initial employment of physics-bachelor's degree recipients, 1969-1974. (Author/KE)

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PHYSICS MANPOWER REPORT

1973-74
SURVEY OF
PHYSICS BACHELOR'S DEGREE RECIPIENTS

AMERICAN INSTITUTE OF PHYSICS / 335 EAST 45 STREET, NEW YORK, N.Y. 10017 / 212-685-1940

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This survey of 1974 physics bachelor's degree recipients was the twelfth one in an annual series. Highlights from the analysis are:

-- a continuing decrease in the number of physics bachelor's degrees granted

-- a small increase in the percentage of bachelor's degree recipients who become graduate physics students

-- a continuing improvement in the employment opportunities for new physics graduates

-- a further increase in the proportion of first-year graduate physics students who are assured of teaching assistantships

-- a small but continuing increase in the proportion of women among the physics degree recipients.

The figure below shows the changes in postbaccalaureate plans of successive graduating classes since the mid 1960's. In 1967 and earlier more than half of those receiving the physics bachelor's degree chose to go on to physics graduate study. By 1974 this proportion had leveled off at one third of the graduating class. During the same period those graduates who changed from physics to other graduate study increased from less than one fifth to approximately one quarter. Since 1971, when employment opportunities were poor, there has been a general increase in those entering civilian employment. The data for the adjacent figure are given in table 3, on page 5.

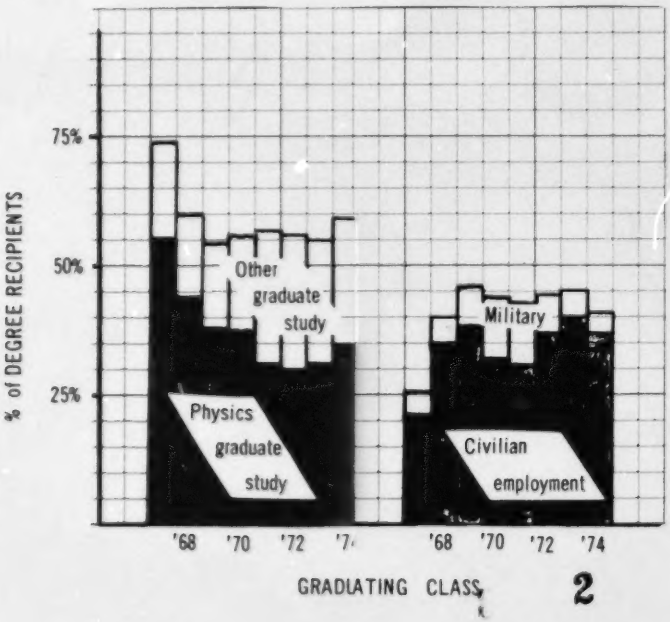

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Table 1 Characteristics of physics bachelor's degree recipients, 1973-74

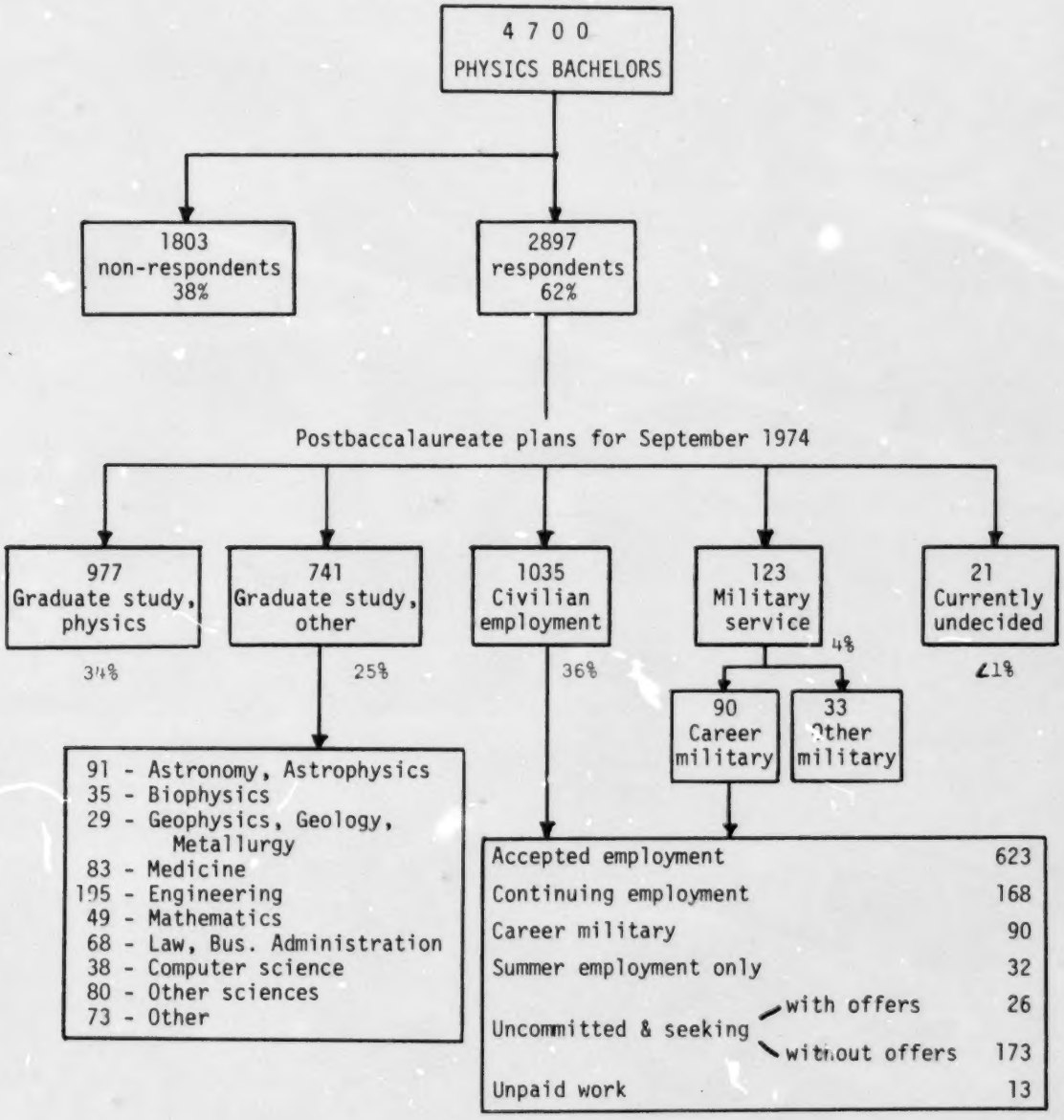
Characteristics	Postbaccalaureate plans			Total
	Grad. study, physics	Grad. study, other	Employment incl. Military service	
Sex				
Female	8%	10%	10%	8.9%
Male	92	90	90	91.0
Citizenship				
U.S.	94%	96%	98%	97.0%
Foreign	6	4	2	3.0
Age				
20 & younger	1%	1%	1%	1.0%
21	10	10	4	7.7
22	58	59	45	53.2
23-29	28	28	42	33.7
30 & older	3	2	8	4.4
Minority groups				
Black	1.6%	1.7%	1.5%	1.6%
Puerto Rican	0.5	0.4	0.4	0.4
Mexican American	0.1	0.4	0.7	0.4
American Indian	0.0	0.1	0.2	0.1
Asian Indian	0.1	0.1	0.2	0.1
Oriental	3.6	2.5	1.5	2.5
Type of H.S. physics				
PSSC	41%	43%	39%	40.4%
Project physics	4	4		4.3
Other*	47	47	45	46.5
None	8	6	11	8.8
Type of undergraduate institution				
PhD granting	56%	53%	41%	49.1%
MS granting	15	10	19	15.3
BS granting	29	37	40	35.6
Number of bachelor's degrees granted N	1600	1220	1880	4700
%	34%	25%	41%	100%

* Other includes not only the traditional high school physics courses but also all modifications of those traditional courses.

2900 individuals responded to the survey and the percentages shown in the table above are based on these responses.

The characteristics of the new degree recipients described in table 1 show very few changes from the year before. The percentage of women is gradually increasing while the percentage of foreign graduates is decreasing. Among the minority groups Puerto Ricans and Mexican Americans are separately listed for the first time; last year's report combined these two groups under the heading "Spanish speaking".

Flow Diagram - Postbaccalaureate plans of 1973-74 bachelor's degree recipients



The flow diagram offers details on two categories of postbaccalaureate plans: (a) the areas of graduate study are listed for those who do not continue with physics in graduate school, and (b) the employment status is outlined as of the summer 1974. The 195 entries into graduate study in engineering are forty more than the shift to engineering last year. High demand for engineers in 1974 and predictions of a shortage ahead are undoubtedly responsible for the increasing switch to engineering. In another comparison with the 1973 graduates, we find that the class of 1974 received more employment offers. Table 5 through 9 present further details on the employment status.

Table 2 Postbaccalaureate plans of the members of five minority groups among the 1974 physics bachelor's degree recipients

Minority group:	Black	Puerto Rican	Mexican American	American Indian	Oriental U.S.	Oriental Foreign
Graduate study in physics:	19	5	1	0	11	24
Other graduate study	12	3	3	1	8	10
Engineering	6	-	-	1	2	2
Medicine or biophysics	5	1	-	-	2	1
Business adm., law	1	-	-	-	1	1
Mathematics	-	-	-	-	-	2
Other	-	2	3	-	3	4
Employment	18	4	8	2	10	8
Number of job offers: 0	2	-	1	-	1	2
1	10	2	4	1	7	3
2	-	1	1	-	1	2
≥3	6	1	2	1	1	1
Total in survey:	49	12	12	3	29	42

Five minority groups are included among the survey respondents. One hundred forty-seven bachelors (5% of the total respondents) identified themselves with one of the five minority groups shown in 2. This represents a minimum number since additional members of minority groups may be among the nonrespondents, either to the minority group question or to the survey itself. Ninety-nine of the minority respondents are U.S. citizens. An examination of the minority groups' citizenship shows that only the 71 Orientals include a significant number of foreigners; hence Orientals are listed in two columns in table 2. Although the numbers are small, a comparison between table 2 and table 3 shows that blacks, Puerto Ricans and Orientals are more likely to choose graduate study in physics than the average respondent to this survey.

Table 3 Postbaccalaureate plans of successive graduating classes of physics bachelors

	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74
Physics grad. study	55%	44%	38%	37%	31%	30%	31%	34%
Other grad. study	19	16	16	19	26	26	24	25
Civilian employment*	22	35	38	32	31	37	40	37
Military service	4	5	8	12	12	7	5	4

* These percentages include new bachelors who were undecided; == 2% in 1970-71 and 1% in 1972-73 and 1973-74.

Table 4 Sources of anticipated support for first-year graduate study

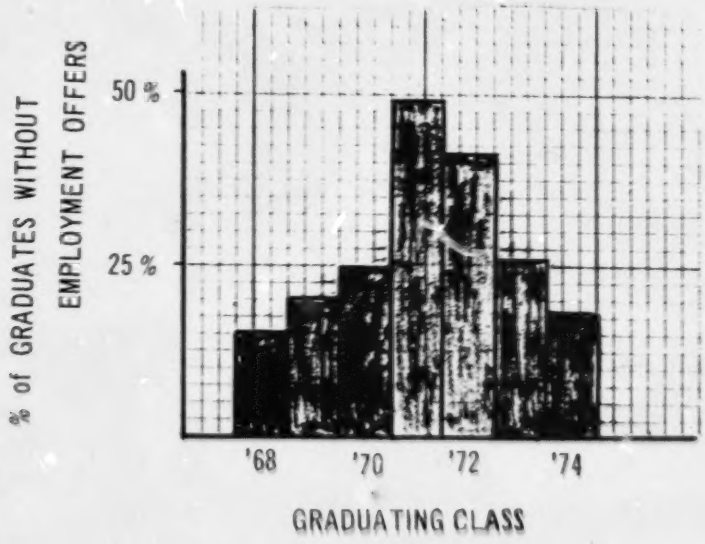
Sources of support	Students planning:					
	physics graduate study			other graduate study		
	9/1972	9/1973	9/1974	9/1972	9/1973	9/1974
Teaching ass'tship	48%	57%	63%	12%	22%	19%
Research ass'tship	10	12	12	14	15	20
Fellowship	15	12	13	17	17	13
Employment	8	8	6	15	15	17
Family, saving, loan	11	4	5	28	19	23
GI Bill	2	1	1	2	3	1
Other	6	6	0	12	9	7
Assured	90%	86%	90%	78%	73%	76%
Intended	10	14	10	22	27	24
Total %	100%	100%	100%	100%	100%	100%
Total N	1580	1550	1600	1370	1200	1220
Graduate study status full-time	96%	97%	98%	97%	97%	96%
Graduate study status part-time	4	3	2	3	3	4

Table 4 compares the availability of sources of support during the last few years for physics bachelors who continue to study physics with those who switch to other fields of study. The availability of assistantships is generally increasing for all first-year graduate students. For those entering physics graduate study, teaching assistantships are the primary form of support. On the other hand family support, savings and loans are more common for those who enter nonphysics graduate study.

Table 5 Changes in employment outlook for new physics bachelor's degree recipients 1968-1974

Number of job offers at graduation	Summer 1968	Summer 1969	Summer 1970	Summer 1971	Summer 1972	Summer 1973	Summer 1974
0	15%	20%	24%	49%	41%	26%	18%
1	34	39	48	39	42	50	50
2 or more	51	41	28	12	17	24	32

Employment-seeking bachelor's degree recipients without job offers 1968-74



The employment market has improved for the third consecutive year for physics bachelors. The increasing demand for engineering graduates since 1971 correlates well with our data for physics. About half of the employed bachelors in 1974 sought engineering-related work. Not only is the percentage of new degree recipients with zero job offers declining, but the percentage with multiple job offers is increasing; almost one third of those interested in immediate employment had more than two offers to choose from. Table 5 and the figure above compare the employment opportunities for those seeking employment among the class of 1974 with those of six earlier years.

Table 6 Use of physics training by newly employed physics bachelors

Selected work activities		Use of physics training: Extensive	Little	None
Science teaching		70%	25%	5%
R&D		75	24	1
Engineering		39	59	2
Computer prog.		12	57	31
Skilled work		15	56	29
For all work activities reported	%	43%	44%	13%
	N	292	302	89

A frequent question is the one dealing with underemployment: to what extent does a graduate make use of this training when he starts employment? Table 6 shows that only a small proportion (13%) of the newly employed physics bachelors feel that they are not using their training at all. The majority of physics bachelors engaged in the traditional work activities such as teaching or research feel that they are making extensive use of their physics training.

Table 7 Full-time employment of new physics bachelor's degree recipients, 1974

Work activity	Industry: manufacture	Industry: service	High sch.	Coll. or univ.	Government: civilian career employ.	Government: military	Res. inst.	Peace Corps	Other (incl. self-employ.)	Total N	Total %
Teaching: Physics	-	2	73	4	2	1	-	14	6	102	12%
Teaching: Other	-	1	13	1	-	-	-	1	4	20	2
R&D and engineer.	192	86	-	13	49	31	34	-	4	409	47
Computer program.	20	35	-	4	12	5	4	-	4	84	10
Mgt. training	17	7	-	-	3	3	1	-	3	34	4
Nonphysics professional	9	17	-	-	7	34	-	-	6	73	8
Skilled	21	20	-	2	5	7	1	-	8	64	7
Unskilled, supervisory & nonsuperv.	16	15	-	6	4	1	2	-	4	48	5
Other	8	10	5	5	9	8	1	-	1	47	5
TOTAL N	283	193	91	35	91	90	43	15	40	881	
TOTAL %	32%	22	10	4	10	10	5	2	5		100%

Table 7 relates work activity to the type of employment. In 1974 fewer graduates appear to accept positions with nonprofessional work activities; namely those listed in the last three rows. Also, a larger proportion of the graduates are working in engineering and R & D — 47% this year compared with 40% in 1973.

Table 8 Starting salaries for new physics bachelors

Type of employer	MEN (509 reported salaries)		WOMEN[1] (69 reported salaries)		TOTAL (578 reported salaries)	
	Distr. by employer	Median	Distr. by employer	Median	Distr. by employer	Median
Industry - manufacture	32%	$935	26%	$922	32%	$930
Industry - service	22	895	24	825	22	890
High school	10	655	14	*	10	665
College or university	4	690	3	*	4	710
Government	20	830	21	855	20	835
Res. institute	5	860	4	*	5	865
Other	7	670	6	*	7	650
Total	100%	860	100%	850	100%	860

* Too few respondents to compute median salary.
[1] Includes accepted and continued employment.

Starting salaries for both men and women in different areas of employment are shown in table 8. Several comparable salaries for chemists and chemical engineers obtained by the American Chemical Society are shown in table 9. Median starting salaries are higher for physicists than chemists in all comparable employment types. Research institutes that employ chemists are probably different organizations from those listed in table 8, hence the substantial difference in starting salaries for those areas.

Table 9 Median starting salaries for chemists and chemical engineers at the bachelor's level

Type of employer	Chemists	Chemical engineers
Industry	$875/mo.	$1055/mo.
College or university	625	*
Government state and local	775	*
Government federal	760	930
Research institute (hospitals and independent research labs)	710	*
Other	740	1025
Total	$820	$1050

Source: Chemical and Engineering News, October 7, 197[illegible], 32

Table 10 Initial employment of physics-bachelor's-degree recipients, 1969-1974

Type of employer	Percentage of employed bachelors				
	1969-70	1970-71	1971-72	1972-73	1973-74
Industry (manufacture)	43%	32%	29%	31%	32%
Industry (service)	-	-	23	23	22
High schools	28	33	25	13	10
College or university	5	7	5	5	4
Gov't (civilian employ.)	10	13	11	6	10
Gov't (career military)				13	10
Res. institutes	4	3	5	3	5
Other	10	12	2	6	7
Total	100%	100%	100%	100%	100%

Table 10 compares the distribution of employers with that of four earlier years. Industry remains the largest employer of new physics bachelors by hiring more than half of the graduates. There has been a decline in the percentage of graduates who accept high school positions as the employment market improves. Since compulsory military service disappeared, we find that a significant number of graduates consider a military career. Table 10 shows this percentage separately among those employed by the government for the last two years.